Space Weather Forecast

Issued on Sunday, 17 September 2023 at 13:31 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of isolated G1-G2 minor/moderate storms to start. G1-G2 minor/moderate storm intervals expected into Tuesday 19th September however, with a likely CME (coronal mass ejection) arrival bringing a slight chance of a G3/Strong storm. Chance of isolated R1 Minor Radio Blackouts throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low over the past 24 hours. There are currently six sunspot regions on the visible disc, with a newly numbered region arriving on the eastern limb. This looks to be a moderately complex region but further classification will only become clear in the coming hours and days. By far the most active spot over the last few days remains near centre disk, but this region has continued to see weakening and fragmentation within its central portion, with a corresponding slight reduction in flare risk. A region in the northwest looks to be fading with an as yet unnumbered NEW region forming quickly to its southeast over the last 12hrs, this region will need monitoring and for now helps to maintain total flare risk. All other sunspot regions stable.

No Earth CMEs (coronal mass ejections) were observed in available imagery.

Solar Wind / Geomagnetic Activity: Solar winds were at slightly elevated levels to start, around 410-430km/s. From approximately 17/0200 UTC winds increased to 470-500km/s following the likely arrival of the CME associated with a flare on the 14th, and have been slowly declining. The IMF was steady and weak initially, but increased with the CME to become erratically moderate. The north-south component was also weak to start but became briefly moderately negative with the arrival of the CME, subsequently becoming predominantly positive. The net result of the above solar wind measures was for provisionally Quiet to Unsettled geomagnetic activity.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Generally Low activity expected, but there remains a chance of isolated Moderate Class flares throughout the period.

Solar Wind / Geomagnetic Activity: The geomagnetic forecast is of lower than average confidence with multiple potentially Earth directed CMEs.

The large filament (arc of plasma) eruption and associated CME which occurred early on the UTC day of 16 Sep has been analysed and modelled, which suggests a likely Earth directed component with an arrival time later on Day 3 (19 Sep).

CME influence waning initially with generally Quite to Unsettled conditions day 1 (17 Sep),

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though there remains slight chance of G1 minor storm intervals. A further chance of G1 from a potential second CME follows into day 2 (18 Sep). G1-G2/Minor-Moderate storm intervals expected into day 3 (19), with a Chance of a G3/strong storm due to the expected arrival of the large CME from the filament eruption on 16 Sep, potentially combined with fast solar wind influence. CME and fast wind effects perhaps lingering into day 4 (20 Sep) but likely waning somewhat.

Energetic Particles / Solar Radiation: No solar radiation storms are expected, with a daily slight chance of an enhancement should any larger flares occur.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	20	30	80	60
Strong	G3	No	1	5	30	10
Severe	G4	No	1	1	2	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	30	30	30	30
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	10	10	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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